

Session 19: Post class test solutions

1. **c. 16.67%**. To show this, assume that the firm is expected to have \$1 in cash flow next year.

$$\text{Value at current cost of capital} = 1 / (.09 - .02) = 14.29$$

$$\text{Value at optimal} = 1 / (.08 - .02) = 16.67$$

$$\% \text{ change in value} = (16.67 / 14.29) - 1 = 16.67\%$$

2. **c. \$22.50/share**. If investors are rational, the increase in firm value has to be spread equally among those who sell their shares back and those who do not.

$$\text{Increase in value/share} = 25 / 10 = \$2.50$$

$$\text{New stock price} = \$22.50$$

Here is a way to confirm that you are right:

$$\text{Number of shares outstanding after buyback} = 10 - (50 / 22.5) = 7.778 \text{ million}$$

$$\text{Value of firm after buyback} = 250 + 25 = 275$$

$$\text{Value of debt after buyback} = 100$$

$$\text{Value of equity after buyback} = 275 - 100 = 175$$

$$\text{Value per share of remaining shares} = 175 / 7.7778 = \$22.50$$

3. **b. \$21.88**. Here is the simplest way to show this:

- Number of shares outstanding after buyback = $10 - (50 / 25) = 8$ million

- Value of firm after buyback = $250 + 25 = 275$

- Value of debt after buyback = 100

- Value of equity after buyback = $275 - 100 = 175$

- Value per share of remaining shares = $175 / 8 = \$21.875$

4. **a. The optimal debt ratio will generally decrease**. If the operating income also drops as the rating drops, you are increasing the “cost” of borrowing, while holding the benefits constant. While it is possible that your optimal is at a high enough rating that you are not affected, the optimal debt ratio will generally decrease.

5. **e. Average operating income over an oil price cycle**. Your objective is not to borrow money based on your last year’s income your best year’s income or your worst year’s income but to borrow money based upon what you can make in an average year. You will have too much debt in the bad years and too little in the good years, but you should be able to use the latter to buffer the former.